CLAIMS

WE CLAIM:

1.   A method of communication, comprising:

assigning at least one channelization code to a data packet; and

5   assigning at least a portion of power available for communicating to the channelization code based on a channel quality metric.

2.   The method of claim 1, wherein assigning the channelization code further comprises assigning at least one channelization code to each of a plurality of data packets, 10 assigning the portions of the power further comprises assigning portions of the power available to at least a subset of channelization codes based on a plurality of channel quality metrics, and the method further comprises:

determining the portions of the available power to be assigned based on the channel quality metrics and a first optimization parameter;

15   determining the values of the number of channelization codes assigned to the data packets based on the determined portions of the available power and a second optimization parameter; and

repeating the determining of the portions of the available power and the determining of the values of the number of channelization codes.

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3.   The method of claim 1, wherein assigning the channelization code further comprises assigning at least one channelization code to each of a plurality of data packets, assigning the portions of the power further comprises assigning portions to at least a subset of

the channelization codes based on a plurality of channel quality metrics, and the method further comprises:

determining the number of channelization codes assigned to each data packet based on a size of the data packet and one of the channel quality estimates associated with the data packet;

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determining the portions of the available power to be assigned to each of the channelization codes based on a first optimization parameter; and

repeating the determining of the number of channelization codes and the determining of the portions of the available power.

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4.   The method of claim 3, further comprising:

terminating the repeating responsive to the assigned channelization codes in a first iteration being the same as the assigned channelization codes in a second later iteration; and

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truncating the subset of assigned channelization codes based on a maximum number of allowable channelization codes.

5.   The method of claim 1, wherein assigning the channelization code further comprises assigning at least one channelization code to each of a plurality of data packets,

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assigning the portions of the power further comprises assigning portions to at least a subset of the channelization codes based on channel quality metrics associated with the data packets, and the method further comprises assigning the channelization codes and the portions of the available power to optimize a Shannon capacity of a channel for communicating the data packets.

6.   The method of claim 1, wherein assigning the channelization code further comprises assigning at least one channelization code to each of a plurality of data packets, assigning the portions of the power further comprises assigning portions to at least a subset of

5   the channelization codes based on channel quality metrics associated with the data packets, and the method further comprises prioritizing the plurality of data packets.

7.   The method of claim 6, wherein prioritizing the plurality of data packets further comprises:

10   identifying a plurality of quality of service classes;

assigning a predetermined amount of the available power to each of the quality of

service classes; and

assigning the channelization codes and the portions of the available power based on

the predetermined amounts for each quality of service classes.

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8.   The method of claim 6, wherein prioritizing the plurality of data packets further comprises:

identifying a plurality of quality of service classes;

assigning the channelization codes and the portions of the available power for a first

20   class of the quality of service classes;

determining a remaining amount of the available power after the assigning for the first

class; and

assigning the channelization codes and the portions of the available power for a second class of the quality of service classes based on the remaining amount of available power.

5   9.   The method of claim 6, wherein prioritizing the plurality of data packets further comprises:

identifying a plurality of quality of service classes;

combining all data packets in the plurality of quality of service classes;

sorting the combined users based on a fairness algorithm; and

10   assigning the channelization codes and the portions of the available power based on the sorting.

10.   A method of communication, comprising:

providing a channel quality estimate; and

15   extracting a data packet encoded with a channelization code from a signal, the channelization code and a power fraction associated with the signal being assigned based on the channel quality estimate.

11.   The method of claim 10, further comprising initiating a communication link

20   over a channel, the communication link being assigned to a quality of service class having a predetermined transmit power assignment and the power fraction is based on a portion of the predetermined transmit power.

12.   The method of claim 10, wherein extracting the data packet further comprises extracting the data packet encoded with the channelization code from the signal received over the channel, wherein the channelization code and the power fraction associated with the signal are assigned based on the channel quality estimate to optimize a Shannon capacity of

5   the channel.

13.   The method of claim 1, further comprising:

generating a cost function using a channel capacity equation having a first constraint,

the cost function including a first optimization parameter associated with the

10   first constraint;

determining a value for the first optimization parameter based on a first order

derivative of the cost function; and

assigning at least one of the channelization code and the portion of power available

for communicating based on the first optimization parameter.

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14.   The method of claim 13, wherein assigning the channelization code further comprises assigning at least one channelization code to each of a plurality of data packets, assigning the portions of the power further comprises assigning portions of the power available to at least a subset of channelization codes based on a plurality of channel quality

20   metrics, the first constraint and first optimization parameter are associated with the power available for communicating, and the method further comprises determining the portions of the available power to be assigned based on the first optimization parameter.

15.   The method of claim 14, further comprising:

defining a second constraint for the channel capacity equation based on the

        channelization codes, the cost function including a second optimization

        parameter associated with the second constraint; and

5   determining the values of the number of channelization codes assigned to the data

        packets based on the second optimization parameter.

16.   A communication system, comprising:

a transmitter adapted to communicate data packets; and

10   an allocation unit adapted to assign at least one channelization code to a data packet

        and assign a portion of power available for communicating to the

        channelization code based on a channel quality metric associated with the data

        packet.

15   17.   The system of claim 16, wherein the allocation unit is further adapted to assign

at least one channelization code to each of a plurality of data packets, determine portions of

the available power to be assigned to at least a subset of the channelization codes based on

the channel quality metrics and a first optimization parameter, determine the values of the

number of channelization codes assigned to each data packets in the subset based on the

20   determined portions of the available power and a second optimization parameter, and repeat

the determining of the portions of the available power and the determining of the values of

the number of channelization codes.

18.   The system of claim 16, wherein the allocation unit is further adapted to assign at least one channelization code to each of a plurality of data packets, determine the number of channelization codes assigned to each user in the subset based on a size of the data packet and the channel quality estimate associated with the data packets, determine portions of the

5   available power to be assigned to at least a subset of the channelization codes based on a first optimization parameter, and repeat the determining of the number of channelization codes and the determining of the portions of the available power.

19.   The system of claim 18, wherein the allocation unit is further adapted to

10   terminate the repeating responsive to the assigned channelization codes in a first iteration being the same as the assigned channelization codes in a second later iteration.

20.   The system of claim 16, wherein the allocation unit is further adapted to assign at least one channelization code to each of a plurality of data packets and determine portions

15   of the available power to be assigned to at least a subset of the channelization codes based on channel quality metrics associated with the plurality of data packets to optimize a Shannon capacity of a channel for communicating the data packets.

21.   The system of claim 16, wherein the allocation unit is further adapted to

20   prioritize a plurality of data packets, assign at least one channelization code to at least a subset of the of the plurality of data packets and determine portions of the available power to be assigned to at least a subset of the channelization codes based on channel quality metrics associated with the plurality of data packets.

22. The system of claim 21, wherein the allocation unit is further adapted to identify a plurality of quality of service classes, assign a predetermined amount of the available power to each of the quality of service classes, and assign the channelization codes and the portions of the available power based on the predetermined amounts for each quality

5 of service classes.

23. The system of claim 21, wherein the allocation unit is further adapted to identify a plurality of quality of service classes, assign the channelization codes and the portions of the available power for a first class of the quality of service classes, determine a

10 remaining amount of the available power after the assigning for the first class, and assign the channelization codes and the portions of the available power for a second class of the quality of service classes based on the remaining amount of available power.

24. The system of claim 21, wherein the allocation unit is further adapted to

15 identify a plurality of quality of service classes, combine all users in the plurality of quality of service classes, sort the combined users based on a fairness algorithm, and assign the channelization codes and the portions of the available power based on the sorting of the combined users.

20 25. The system of claim 24, wherein the allocation unit is further adapted to generate a cost function using a channel capacity equation having a first constraint, the cost function including a first optimization parameter associated with the first constraint, determine a value for the first optimization parameter based on a first order derivative of the

cost function, and assign at least one of the channelization code and the portion of power available for communicating based on the first optimization parameter.

26. The system of claim 25, wherein the first constraint and first optimization

5 parameter are associated with the power available for communicating, and the allocation unit is further adapted to assign at least one channelization code to each of a plurality of data packets, assign portions of the power available to at least a subset of channelization codes based on a plurality of channel quality metrics, and determine the portions of the available power to be assigned based on the first optimization parameter.

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27. The system of claim 26, wherein a second constraint is defined for the channel capacity equation based on the channelization codes, the cost function includes a second optimization parameter associated with the second constraint, and the allocation unit is further adapted to determine the values of the number of channelization codes assigned to the

15 data packets based on the second optimization parameter.

28. A system, comprising:

an allocation unit adapted to assign at least one channelization code to a data packet; and

20 means for assigning a portion of power available for communicating over a channel to the channelization code based on a channel quality metric associated with the data packet.

29.   The system of claim 21, further comprising:

means for determining a number of channelization codes assigned to each of a plurality of data packets based on a size of the data packet and a channel quality estimate associated with each data packet;

means for assigning portions of the power available to at least a subset of the channelization codes based on a first optimization parameter; and

means for iterating the determining of the number of channelization codes and the determining of the portions of the available power.